From sadowskp@usafcrqs.nellis.af.mil Mon Nov 06 19:24:25 1995
Received: from bncc.nellis.af.mil (bncc.nellis.af.mil [132.58.120.19]) by
sys1.tapr.org (8.7.1/8.7.1) with SMTP id TAA15141 for <hfsig@tapr.org>; Mon, 6 Nov
1995 19:24:08 -0600
Received: from mailgtwy.nellis.af.mil by bncc.nellis.af.mil with SMTP
     (1.38.193.4/16.2) id AA14107; Mon, 6 Nov 1995 16:31:21 -0800
Received: by mailgtwy.nellis.af.mil with Microsoft Mail
     id <309E91B8@mailgtwy.nellis.af.mil>; Mon, 06 Nov 95 16:52:40 cst
From: "Sadowski,P MAJ JCSAR/JT&E" <sadowskp@usafcrqs.nellis.af.mil>
To: hfsig <hfsig@tapr.org>
Subject: mu-Law compandor
Date: Mon, 06 Nov 95 08:46:00 cst
Message-Id: <309E91B8@mailgtwy.nellis.af.mil>
Encoding: 21 TEXT
X-Mailer: Microsoft Mail V3.0

I have a question for the DSP types here. Analog Devices has a neat little
evaluation module with dual channel "CD ROM" quality A/D (14 bits
resolution) and D/A (also 14 bits resolution)... the sampling rates are up
to 44 khz on each chanel... and in fact the way the A/D's and D/A's work
they do up to 64x oversampling... that's alot of samples but not necessary
for modem work I'm sure...

Anyway, the question I have is based on the fact that the next stage (which
can't be bypassed) does an A-Law or mu-Law compandor (nonlinear companding
used by telco) so that the output values are no longer 14 bits (nor input
values 14 bits) but rather they are 8 bits companded...

Finally :) the question is... what effect does using companded data have on
the DSP algorithms? Do you have to modify the values - or just ignore them?
  And, for modems that rely on AM... what impact does companding have...

Thanks in advance

AH6LS
sadowskp@usafcrqs.nellis.af.mil

From karn@qualcomm.com Tue Nov 07 00:31:02 1995
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by
sys1.tapr.org (8.7.1/8.7.1) with ESMTP id AAA29566 for <hfsig@tapr.org>; Tue, 7
Nov 1995 00:30:58 -0600
Received: (karn@localhost) by servo.qualcomm.com (8.7.1/QC-BSD-2.5.1) id WAA13551;
Mon, 6 Nov 1995 22:30:53 -0800 (PST)
Date: Mon, 6 Nov 1995 22:30:53 -0800 (PST)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199511070630.WAA13551@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <309E91B8@mailgtwy.nellis.af.mil> (sadowskp@usafcrqs.nellis.af.mil)
Subject: Re: [HFSIG:710] mu-Law compandor

>Finally :) the question is... what effect does using companded data have on
>the DSP algorithms? Do you have to modify the values - or just ignore them?

It's common for DSP code to use companded codecs -- we do that in our
cell phone vocoders. As I understand it, the first thing you do with
a companded sample when you get it is to convert it back to 14-bit linear,
so that all DSP operations are on linear samples.

Of course, the quantizing distortion is now a function of the signal
amplitude and is worse than a 14-bit linear codec, but DSP arithmetic
is so much easier to perform on linear samples -- and you get to use
cheap codecs.

Phil

From droesler@cacd.rockwell.com Wed Nov 15 14:04:28 1995
Received: from global3 (global3.cacd.rockwell.com [131.198.66.3]) by sys1.tapr.org
(8.7.1/8.7.1) with SMTP id OAA01150 for <hfsig@tapr.org>; Wed, 15 Nov 1995
14:04:24 -0600
Received: from ccmgw1.cacd.rockwell.com (pc110417) by global3 (5.0/SMI-4.1)
     id AA26157; Wed, 15 Nov 1995 13:10:54 +0600
Received: from cc:Mail SMTPLINK 2.1 by ccmgw1.cacd.rockwell.com
     id AA816462639; Wed, 15 Nov 95 13:08:35 cst
Date: Wed, 15 Nov 95 13:08:35 cst
From: "droesler" <droesler@cacd.rockwell.com>
Encoding: 2 Text
Message-Id: <9510158164.AA816462639@ccmgw1.cacd.rockwell.com>
To: hfsig@tapr.org
Return-Receipt-To: droesler@cacd.rockwell.com
Subject: subscribe

Dan Roesler, HFIA
droesler@cacd.rockwell.com

From fperkins@onramp.net Sat Nov 25 11:39:31 1995
Received: from mailhost.onramp.net (mailhost.onramp.net [199.1.11.3]) by
sys1.tapr.org (8.7.1/8.7.1) with SMTP id LAA06216 for <hfsig@tapr.org>; Sat, 25
Nov 1995 11:39:28 -0600 (CST)
Received: from 199.184.212.185 (stockyard22.onramp.net [199.184.212.185]) by
mailhost.onramp.net (8.6.12/8.6.5) with SMTP id LAA07731 for <hfsig@tapr.org>;
Sat, 25 Nov 1995 11:39:25 -0600
Date: Sat, 25 Nov 1995 11:39:25 -0600
Message-Id: <199511251739.LAA07731@mailhost.onramp.net>
MIME-Version: 1.0
Content-Type: text/plain
Content-Transfer-Encoding: 7bit
From: fperkins@onramp.net
Subject: Checking
To: hfsig@tapr.org
In-Reply-To: <309E91B8@mailgtwy.nellis.af.mil>
X-Mailer: SPRY Mail Version: 04.00.06.17

Hi,

Just a test to see if the reflector is still active.

73 Frank WB5IPM

From cbuttsch@slonet.org Sat Nov 25 12:30:30 1995
Received: from biggulp.callamer.com (cbuttsch@biggulp.callamer.com [199.74.141.2])
by sys1.tapr.org (8.7.1/8.7.1) with SMTP id MAA07936 for <hfsig@tapr.org>; Sat, 25
Nov 1995 12:30:27 -0600 (CST)
Received: (from cbuttsch@localhost) by biggulp.callamer.com (8.6.12/8.6.9-
callamer-rdw080995) id KAA03280; Sat, 25 Nov 1995 10:30:16 -0800
Date: Sat, 25 Nov 1995 10:30:16 -0800 (PST)
From: Clifford Buttschardt <cbuttsch@slonet.org>
To: fperkins@onramp.net
cc: hfsig@tapr.org
Subject: Re: [HFSIG:713] Checking
In-Reply-To: <199511251739.LAA07731@mailhost.onramp.net>
Message-ID: <Pine.OSF.3.91.951125102533.30032A-100000@biggulp.callamer.com>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Hi Frank. yes the reflector is operating. Glad to see you are still
alive and kicking. You might be interested to know that we still are
using the old fashioned TRS80 model 100 laptop to steer antennas!! This
time we are using GM4JJJ moontrak program for that! The old QEX
interface will be used as before. David programmed his PC-8201 using
some unknown calls to the model 100 such as LOCATE which we need to work
out, but otherwise the old model T still works! 73 Cliff Buttschardt W6HDO

On Sat, 25 Nov 1995 fperkins@onramp.net wrote:

> Hi,
>
> Just a test to see if the reflector is still active.
>
> 73 Frank WB5IPM
>
>

From forrerj@ucs.orst.edu Sun Nov 26 17:31:54 1995
Received: from ucs.orst.edu (root@UCS.ORST.EDU [128.193.4.5]) by sys1.tapr.org
(8.7.1/8.7.1) with SMTP id RAA05129 for <hfsig@tapr.org>; Sun, 26 Nov 1995
17:31:48 -0600 (CST)
Received: from p04.t0.monrotel.com by ucs.orst.edu;
(5.65v3.0/1.1.8.2/24Sep94-1201PM)
     id AA23246; Sun, 26 Nov 1995 15:31:31 -0800
Message-Id: <9511262331.AA23246@ucs.orst.edu>
X-Sender: forrerj@ucs.orst.edu
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Sun, 26 Nov 1995 15:33:29 -0800
To: hfsig@tapr.org
From: forrerj@ucs.orst.edu (Johan Forrer)
Subject: Re: [HFSIG:714] Re: Checking

Hi all,

I apologise for being so quiet on HFSIG. Hopefully I'll be able to spend a
bit more time with you in a little while - like after the second week in
January. Still in the middle of exams and just getting by one day at a time.

Welcome to Cliff and the other CCW experimentors - I am quite interested to
learn more about the PSK experiments. How about giving us a summary Cliff?

Thanks for your patience - 73's

--Johan, KC7WW

From cbuttsch@slonet.org Mon Nov 27 15:58:44 1995
Received: from biggulp.callamer.com (cbuttsch@biggulp.callamer.com [199.74.141.2])
by sys1.tapr.org (8.7.1/8.7.1) with SMTP id PAA15596 for <hfsig@tapr.org>; Mon, 27
Nov 1995 15:58:41 -0600 (CST)
Received: (from cbuttsch@localhost) by biggulp.callamer.com (8.6.12/8.6.9-
callamer-rdw080995) id NAA10639; Mon, 27 Nov 1995 13:58:33 -0800
Date: Mon, 27 Nov 1995 13:58:33 -0800 (PST)
From: Clifford Buttschardt <cbuttsch@slonet.org>
To: hfsig@tapr.org
cc: hfsig@tapr.org
Subject: Re: [HFSIG:715] Re: Checking
In-Reply-To: <9511262331.AA23246@ucs.orst.edu>
Message-ID: <Pine.OSF.3.91.951127135742.8475B-100000@biggulp.callamer.com>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Hi again Johan. OK, let me try and make up a file that is fairly short
with the essentials of Coherent CW and BPSK for all! 73 W6HDO

On Sun, 26 Nov 1995, Johan Forrer wrote:

> Hi all,
>
> I apologise for being so quiet on HFSIG. Hopefully I'll be able to spend a
> bit more time with you in a little while - like after the second week in
> January. Still in the middle of exams and just getting by one day at a time.
>
> Welcome to Cliff and the other CCW experimentors - I am quite interested to
> learn more about the PSK experiments. How about giving us a summary Cliff?
>
> Thanks for your patience - 73's
>
> --Johan, KC7WW
>
>

From jalocha@home.ifj.edu.pl Mon Nov 27 16:55:11 1995
Received: from home-gate.ifj.edu.pl (home-gate.ifj.edu.pl [192.86.14.17]) by
sys1.tapr.org (8.7.1/8.7.1) with SMTP id QAA17873 for <hfsig@tapr.org>; Mon, 27

Nov 1995 16:55:00 -0600 (CST)
Received: from home.ifj.edu.pl by home-gate.ifj.edu.pl (JNOS1.10l) with SMTP
     id AA4071 ; Mon, 27 Nov 95 22:54:55 UTC
Date: Mon, 27 Nov 95 23:47:15 MET
From: "Pawel Jalocha" <jalocha@home.ifj.edu.pl>
Message-ID: <784.jalocha@home.ifj.edu.pl>
To: hfsig@tapr.org, dsp4@nic.funet.fi
Reply-to: jalocha@home-gate.ifj.edu.pl
Subject: BPSK modem for satellites

Hi all,

I have made up a 400 bps BPSK modem (for AO-13 telemetry) and I plan to
scale it to the 1200 bps version. Is there anybody interrested out there
who could verify its operation and compare it against some other designs ?
The modem runs on the EVM56K or on the DSPCARD4.
I will try to make tests with my radio equipment but my only VHF/UHF
antenna is omnidirectional thus the satellite signals are rather weak.

Pawel

From danie.brynard@pixie.co.za Mon Nov 27 22:15:23 1995
Received: from f15.pix.za (root@f15.pix.za [196.11.62.108]) by sys1.tapr.org
(8.7.1/8.7.1) with ESMTP id WAA01835 for <hfsig@tapr.org>; Mon, 27 Nov 1995
22:15:18 -0600 (CST)
Received: from net-5.pta.pix.za (net-5.pta.pix.za [196.11.63.141]) by f15.pix.za
(8.7.1/8.6.11) with SMTP id GAA17506 for <hfsig@tapr.org>; Tue, 28 Nov 1995
06:15:26 +0200
Date: Tue, 28 Nov 1995 06:15:26 +0200
Message-Id: <199511280415.GAA17506@f15.pix.za>
X-Sender: pak03226@pixie.co.za
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: danie.brynard@pixie.co.za (Danie Brynard)
Subject: Re: [HFSIG:715] Re: Checking

>
>Welcome to Cliff and the other CCW experimentors - I am quite interested to
>learn more about the PSK experiments. How about giving us a summary Cliff?
>

Yes me too !

Danie zs6awk
danie.brynard@pixie.co.za

From togo@aloha.com Mon Nov 27 22:43:36 1995
Received: from mail.pixi.com (phoenix.pixi.com [204.182.46.6]) by sys1.tapr.org
(8.7.1/8.7.1) with SMTP id WAA03027 for <hfsig@tapr.org>; Mon, 27 Nov 1995
22:43:30 -0600 (CST)
Received: from aloha.com (togo@mango.aloha.com [204.182.47.1]) by mail.pixi.com

(8.6.12/SMI-4.1) with SMTP id SAA00621 for <hfsig@tapr.org>; Mon, 27 Nov 1995
18:42:54 -1000
Date: Mon, 27 Nov 1995 18:42:42 -1000 (HST)
From: "Tony Godshall via aloha.com" <togo@aloha.com>
To: hfsig@tapr.org
Subject: Re: [HFSIG:716] Re: Checking
In-Reply-To: <Pine.OSF.3.91.951127135742.8475B-100000@biggulp.callamer.com>
Message-ID: <Pine.BSD/.3.91.951127182850.24331A-100000@aloha.com>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

On Mon, 27 Nov 1995, Clifford Buttschardt wrote:

> Hi again Johan. OK, let me try and make up a file that is fairly short
> with the essentials of Coherent CW and BPSK for all! 73 W6HDO

Please do! I anxiously await.

> > Welcome to Cliff and the other CCW experimentors - I am quite interested to
> > learn more about the PSK experiments. How about giving us a summary Cliff?

I am also! Please forgive me taking up the bandwidth with "Me too"
messages, but there seemed to be lots of wasted bandwidth already (all
quiet) and I suppose I wanted to de-lurk and let you all know I was out
here.

I have some good background with digital algorithms (data correction and
compression) and am interested in learning more about radio (my level in
tech class) and digital encoding.

My personal idea of a good way to implement digital on HF is to get a
good fast DAC and ADC and use a DSP or the main CPU to generate the
signal waveform and decode it. That way we could start with a simple
encoding system now and move to better systems later with simple upgrades
in software. Essentially the software ought to be able to do the
following now ...

1. Create transmittable waveforms that represent data

2. Decode such waveforms received.

This ought to be enough to build point to point systems for testing.

As our experience grows, our software could

3. Detect multipath interference and use echo-cancellation techiques to
remove it.

4. Perform some kind of bandwidth allocation (CSMA/CD if practical,
TDMA, reservation, what have you) to handle systems more complex than
point to point.

Anyway, I digress...

73 de wh6zd

From lynnc@sos.sos.net Mon Nov 27 23:46:48 1995
Received: from sos.sos.net (sos.sos.net [199.165.149.1]) by sys1.tapr.org
(8.7.1/8.7.1) with SMTP id XAA05497 for <hfsig@tapr.org>; Mon, 27 Nov 1995
23:46:45 -0600 (CST)
From: lynnc@sos.sos.net
Received: from 199.165.149.216 (sos-dialup25.sos.net) by sos.sos.net with SMTP id
AA08506
  (5.65c/IDA-1.4.4 for hfsig@tapr.org); Mon, 27 Nov 1995 21:42:49 -0800
Date: Mon, 27 Nov 1995 21:42:49 -0800
Message-Id: <199511280542.AA08506@sos.sos.net>
Mime-Version: 1.0
Content-Type: text/plain
Content-Transfer-Encoding: 7bit
Subject: Re: [HFSIG:719] Re: Checking
To: hfsig@tapr.org
In-Reply-To: <Pine.BSD/.3.91.951127182850.24331A-100000@aloha.com>
X-Mailer: SPRY Mail Version: 04.00.06.17

Just feel compelled to inject,
   Hey, yr not pulling my (our) leg(s) are u? it sur
sounds like a high-tech description of what we in the
ol days called CW (just kidding, I am really absolutely
fascinated with the mail here)
   Lurker Lynn (W7LTQ) 73

From jalocha@home.ifj.edu.pl Wed Nov 29 08:40:22 1995
Received: from home-gate.ifj.edu.pl (home-gate.ifj.edu.pl [192.86.14.17]) by
sys1.tapr.org (8.7.2/8.7.1) with SMTP id IAA22101 for <hfsig@tapr.org>; Wed, 29
Nov 1995 08:40:13 -0600 (CST)
Received: from home.ifj.edu.pl by home-gate.ifj.edu.pl (JNOS1.10l) with SMTP
     id AA4119 ; Wed, 29 Nov 95 14:40:21 UTC
Date: Wed, 29 Nov 95 15:24:45 MET
From: "Pawel Jalocha" <jalocha@home.ifj.edu.pl>
Message-ID: <1244.jalocha@home.ifj.edu.pl>
To: dsp4@nic.funet.fi, hfsig@tapr.org
Reply-to: jalocha@home-gate.ifj.edu.pl
Subject: BPSK modem for 1200 bps

Scaling my BPSK modem for 1200 bps did not take that long
and it's ready now. I could make it lock onto a piece of WO-18
transmition which I have recorded with my soundcard.
I will hunt for more of course and try to decode some AX.25 frames.
Is that possible at all with an omnidirectional antenna ?

For the time being I have few questions regarding the BPSK and satellites:

1. Which filter shape I should use at the demodulator ?
   I have read one G3RUH's article about it and it seems that almost
   every satellite transmits with a different symbol shape ?
   Is there a good comprimise or one should really match the shape

   for best noise performance ?

2. Doppler drift: from what I see I should expect up to 80-100 Hz/second
   of carrier drift on 70 cm (and 5 times more on 2400 MHz) ?
   If the tranceiver tunes in 10 Hz steps the UP/DOWN "botton pushing rate"
   gets to some 10 per second which sounds quite many ?
   Is that OK for most tranceivers ?
   What is the typical time needed to hold the button so it reacts ?

3. Transmitting to the satellite: The signal should be 1200 bps
   Manchester encoded which is "almost" the same as 1200 bps BPSK
   on a 1200 Hz carrier. My modem generates BPSK by it's nature
   and there is no problem to tell it to make carrier at 1200 Hz
   but there is no guarantie that the carrier stays synchronous
   with the data stream. Is this the strict requirement for satellite's
   uplink ?

If there is somebody out there who can answer please do.
Thanks, Pawel.

From cbuttsch@slonet.org Wed Nov 29 11:19:46 1995
Received: from biggulp.callamer.com (cbuttsch@biggulp.callamer.com [199.74.141.2])
by sys1.tapr.org (8.7.2/8.7.1) with SMTP id LAA27342 for <hfsig@tapr.org>; Wed, 29
Nov 1995 11:19:43 -0600 (CST)
Received: (from cbuttsch@localhost) by biggulp.callamer.com (8.6.12/8.6.9-
callamer-rdw080995) id JAA14668; Wed, 29 Nov 1995 09:19:39 -0800
Date: Wed, 29 Nov 1995 09:19:39 -0800 (PST)
From: Clifford Buttschardt <cbuttsch@slonet.org>
To: hfsig@tapr.org
cc: Johan Forrer <forrerj@ucs.orst.edu>,
        Bill DeCarle <76170.3362@compuserve.com>
Subject: Re: [HFSIG:719] Re: CCW and BPSK
In-Reply-To: <Pine.BSD/.3.91.951127182850.24331A-100000@aloha.com>
Message-ID: <Pine.OSF.3.91.951129084942.5285A-100000@biggulp.callamer.com>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Many thanks to all of you that requested information on Coherent CW and
the BPSK experiments we are doing. I obtained requests from South Africa
through Europe and of course from Johan. I must say I am somewhat
intimidated by this group as we really are doing what might be best
called the "last hardware breath before DSP!" In fact, the use of the
Audio Spectrum analyzer in QST for Jan 1992 by Bill DeCarle probably is
the first step with DSP being conducted by any computer following. Also,
the Packet Status Register that just arrived certainly indicated that we
are somewhat reinventing the wheel! Do pay attention to this source as
well as the twice monthly column in the Digital Journal by Peter-G3IRM.
     All of the software advances in our effort is due to VE2IQ, Bill
DeCarle in Quebec, Canada, By CC of this message be sure and obtain his
information regarding kits, completed units and disks. Start with QST
for Jan '92. What you might have read about "sample and hold" techniques
are completely out of style now and the best reference for this is QEX
magazine for February 1994--"A DSP Version of Coherent-CW (CCW)". This

is a practical, real explaination of the technique.
     What hardware that is being developed has been done by two non-hams interested in point to point computer communications. Max Carter is the prime innovator of very slow BPSK techniques. His article was in the COMMUNICATIONS QUARTERLY for Fall 1990---"Super Narrowband Techniques Equalize Power Inequity on 1750 Meters". John West in Longmont, Colorado is developing a series of PC boards to be made available using the Max Carter design and DeCarle software. WB6RIJ, WD4PLI and I are doing the final design checkout as we find time to help the project.
     BPSK (BiPhaseShiftKeying) is a modification of CCW programs added on to DeCarles library after version 3.2. Where CCW operates at 12 wpm telegraphic code, BPSK operates at one character per second ASCII! The latter is a weak signal technique developed for the experimenters in the 1750 meter band (160-190 KHz) which is not available all over the world. By the way, comments in PSR by RENALDO, finally elude to BPSK being legal in the ham bands where there was some doubt previously.
     While there is so much more to be said about this let me conclude here with at least enough to get the HFSIG interested in more! As you can appreciate our efforts do not replace yours! Cliff Buttschardt W6HDO

From cbuttsch@slonet.org Wed Nov 29 12:14:17 1995
Received: from biggulp.callamer.com (cbuttsch@biggulp.callamer.com [199.74.141.2]) by sys1.tapr.org (8.7.2/8.7.1) with SMTP id MAA29943 for <hfsig@tapr.org>; Wed, 29 Nov 1995 12:14:14 -0600 (CST)
Received: (from cbuttsch@localhost) by biggulp.callamer.com (8.6.12/8.6.9-callamer-rdw080995) id KAA25032; Wed, 29 Nov 1995 10:14:08 -0800
Date: Wed, 29 Nov 1995 10:14:08 -0800 (PST)
From: Clifford Buttschardt <cbuttsch@slonet.org>
To: hfsig@tapr.org
cc: hfsig@tapr.org
Subject: Re: [HFSIG:721] BPSK modem for 1200 bps
In-Reply-To: <1244.jalocha@home.ifj.edu.pl>
Message-ID: <Pine.OSF.3.91.951129101136.5285H-100000@biggulp.callamer.com>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Pawel, your comments regarding 1200 baud BPSK are very valuable. We have used the TAPR modem on 300 baud HF but not 1200 buad (except for some brief experiments on ten meters). The questions you ask are in need of answers by all!   73   Cliff Buttschardt   W6HDO

From jalocha@home.ifj.edu.pl Wed Nov 29 15:32:58 1995
Received: from home-gate.ifj.edu.pl (home-gate.ifj.edu.pl [192.86.14.17]) by sys1.tapr.org (8.7.1/8.7.1) with SMTP id PAA02252 for <hfsig@tapr.org>; Wed, 29 Nov 1995 15:32:44 -0600 (CST)
Received: from home.ifj.edu.pl by home-gate.ifj.edu.pl (JNOS1.10l) with SMTP
     id AA4126 ; Wed, 29 Nov 95 21:32:28 UTC
Date: Wed, 29 Nov 95 22:08:57 MET
From: "Pawel Jalocha" <jalocha@home.ifj.edu.pl>
Message-ID: <793.jalocha@home.ifj.edu.pl>
To: hfsig@tapr.org, dsp4@nic.funet.fi
Reply-to: jalocha@home-gate.ifj.edu.pl
Subject: 1200 bps BPSK modem works !

I just learned that my new modem works !

I set up my equipment for a WO-18 pass (437.102) - the modem locked onto
the signal and I was following the Doppler shift by hand while watching
the UP/DOWN LEDs of the DSPCARD4. The lock was being lost few times when
the signal was fading completely into noise. It didn't decode any frame...

But very soon there was a pass of LO-19 and I switched to 437.125, the signal
sounded stronger, I concentrated on good Doppler tracking and in the middle
of the pass I noticed that some 1250 characters have been received on the
serial port which ment there were good AX.25 frames !
The lock would still be lost about ones per minute when the signal
sounded like being gone completely but it was coming back afterwards.
I received in total about 25 frames and 1315 bytes on the KISS port
for the whole pass. Some frames were long like these (JNOS trace output):

```
Wed Nov 29 21:47:53 1995 - tnc recv:
KISS: Port 0 Data
AX25: LUSAT-11->QST-1 UI pid=0xbb
0000  .ZG...p.....r.0..Q8a..........v..0...W.............0p..m.......
0040  .......0W.]y.............0..q,1.AG....@....

Wed Nov 29 21:48:02 1995 - tnc recv:
KISS: Port 0 Data
AX25: LUSAT-11->QST-1 UI pid=0xbb
0000  .[G.........EptA]p.S..D..N.-.R...2....#*...w2j..NA..t.4..E&..E.j
0040  .PK...........x{.....s.................. .......44FR1127.8YDPK...
0080  ........x{.@l..y.................. .......SATPK..........k...7...
00c0  ..~.

Wed Nov 29 21:48:06 1995 - tnc recv:
KISS: Port 0 Data
AX25: LUSAT-1->TLM UI pid=Text
0000  ...0.d...h.m.A...4...d.............4.......................{....
0040  .%.Y {!x".#,$(%,&.'.(.).*.+.,.-G../.0.1.2.3I4.5.6.7.8.9.:.;.<.
```

My radio setup:
- Discone antenna on the roof
- 25 meters of thin coax (I know, that's terrible for 70cm)
- ICOM R7000 which tunes only in 100 Hz step and it's PLL sounds like it has
  lot of phase noise. But the lock would not be lost when the receiver
  was jumping by 100 Hz.

How much luck did I have so I could copy LO-19 ? :-)

Pawel

From rob@pe1chl.ampr.org Thu Nov 30 06:38:57 1995
Received: from sun4nl.NL.net (sun4nl.NL.net [193.78.240.1]) by sys1.tapr.org
(8.7.1/8.7.1) with SMTP id GAA07956 for <hfsig@tapr.org>; Thu, 30 Nov 1995
06:38:31 -0600 (CST)
Received: from NE3995 by sun4nl.NL.net via EUnet

id AA11221 (5.65b/CWI-3.3); Thu, 30 Nov 1995 13:38:24 +0100
Received: by sys3.pe1chl.ampr.org (8.6.12) id MAA05868 ; Thu, 30 Nov 1995 12:23:39 +0100
From: rob@pe1chl.ampr.org (Rob Janssen)
Message-Id: <MAA05868@sys3.pe1chl.ampr.org>
Subject: Re: BPSK modem for 1200 bps
To: jalocha@home-gate.ifj.edu.pl
Date: Thu, 30 Nov 1995 12:23:38 +0100 (MET)
Cc: dsp4@nic.funet.fi, hfsig@tapr.org
In-Reply-To: <1243.jalocha@home.ifj.edu.pl> from "Pawel Jalocha" at Nov 29, 95 03:24:45 pm
Reply-To: pe1chl@wab-tis.rabobank.nl
Content-Type: text

According to Pawel Jalocha:
> 1. Which filter shape I should use at the demodulator ?
>   I have read one G3RUH's article about it and it seems that almost
>   every satellite transmits with a different symbol shape ?
>   Is there a good comprimise or one should really match the shape
>   for best noise performance ?

There are quite some differences between the satellites.
For example, JAS has (had? is it still active?) a very clean signal, while on PACSAT etc there is a lot more phase noise. This was a problem with the G3RUH modem which had an unsuitable filter for it and needed to be modified.

Also, some of the satellites have two different transmitters: the standard one and a "raised cosine" transmitter. I think one of the two has failed on one or more sats, so you find a mixture of signal types.

With your marginal signal you may be in the position to see difference between the different decoding techniques.

> 2. Doppler drift: from what I see I should expect up to 80-100 Hz/second
>   of carrier drift on 70 cm (and 5 times more on 2400 MHz) ?
>   If the tranceiver tunes in 10 Hz steps the UP/DOWN "botton pushing rate"
>   gets to some 10 per second which sounds quite many ?
>   Is that OK for most tranceivers ?
>   What is the typical time needed to hold the button so it reacts ?

This varies widely between transmitters...
Some may be able to do it, some not. This really needs to be configurable.
(see my other mail)

It is also possible to send CAT commands to many transmitters, for a absolute frequency update. It could be a possibility to use that to send updates at a certain rate, where the step is different each time.
Unfortunately, it is much more complicated, and even more dependent on the transceiver make and model...

Also, absolute frequency control is more suitable for a tracker type program. Maybe it should work in co-operation: tracker sends absolute

frequencies, modem informs tracker of error. When the keps and station
time are reasonably accurate, the error should be quite constant and
only dependent on temperature etc.

I have used open-loop control (tracker controls the frequency, no
report back from modem) on 9600 bps, but it is difficult on 1200 bps
because of the extra needed accuracy.

> 3. Transmitting to the satellite: The signal should be 1200 bps
>   Manchester encoded which is "almost" the same as 1200 bps BPSK
>   on a 1200 Hz carrier. My modem generates BPSK by it's nature
>   and there is no problem to tell it to make carrier at 1200 Hz
>   but there is no guarantie that the carrier stays synchronous
>   with the data stream. Is this the strict requirement for satellite's
>   uplink ?

I think so... but I don't know for sure.
The original G3RUH modem just uses a XOR between data and clock,
so it is synchronous. You could do the same (with a lowpass filter
after it), I think it should be an easy addition.

Rob

--
+-------------------------------------+---------------------------------------+
| Rob Janssen   rob@knoware.nl | BBS: +31-302870036 (2300-0730 local) |
| AMPRnet: rob@pe1chl.ampr.org | AX.25 BBS: PE1CHL@PI8WNO.#UTR.NLD.EU |
+-------------------------------------+---------------------------------------+

From tomob@ix.netcom.com Thu Nov 30 13:09:40 1995
Received: from ix7.ix.netcom.com (ix7.ix.netcom.com [199.182.120.7]) by
sys1.tapr.org (8.7.2/8.7.2) with SMTP id NAA11173 for <HFSIG@tapr.org>; Thu, 30
Nov 1995 13:09:36 -0600 (CST)
From: tomob@ix.netcom.com
Received: from ix-chi10-03.ix.netcom.com by ix7.ix.netcom.com (8.6.12/SMI-4.1/
Netcom)
     id LAA14039; Thu, 30 Nov 1995 11:08:56 -0800
To: HFSIG@tapr.org (HFSIG)
Subject: Loading problems with EVM56
Date: Thu, 30 Nov 95 19:12:52 GMT
Message-ID: <M.113095.131252.06@ix-chi10-03.ix.netcom.com>
X-Mailer: Quarterdeck Message Center [1.0]

Hello All -

I have completed the building of the interface circuit for the EVM56. I beieve I
am having trouble in my prodcedures to load the code needed to run the multi-tone
modem. I first load BIOS.CLD via the debugger, and then try to load the modem
software. At that time, the debugger crashes and locks up the entire PC forcing
me
to reset the PC and start over again. What am I doing wrong????? Please help!!!

73 de Tom, N9GUN

tomob@ix.netcom.com

From danie.brynard@pixie.co.za Thu Nov 30 23:18:31 1995
Received: from f15.pix.za (root@f15.pix.za [196.11.62.108]) by sys1.tapr.org
(8.7.2/8.7.2) with ESMTP id XAA01863 for <hfsig@tapr.org>; Thu, 30 Nov 1995
23:18:22 -0600 (CST)
Received: from net-11.pta.pix.za (net-11.pta.pix.za [196.11.63.147]) by f15.pix.za
(8.7.1/8.6.11) with SMTP id HAA19703 for <hfsig@tapr.org>; Fri, 1 Dec 1995
07:18:41 +0200
Date: Fri, 1 Dec 1995 07:18:41 +0200
Message-Id: <199512010518.HAA19703@f15.pix.za>
X-Sender: pak03226@pixie.co.za (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: danie.brynard@pixie.co.za (Danie Brynard)
Subject: Re: [HFSIG:721] BPSK modem for 1200 bps

Hi All

First of all I am also learning. So don't think everything I say is true :-)

>Scaling my BPSK modem for 1200 bps did not take that long
>and it's ready now. I could make it lock onto a piece of WO-18
>transmition which I have recorded with my soundcard.
>I will hunt for more of course and try to decode some AX.25 frames.

Webersat 18 has a 1200bps BPSK (on SSB) AX.25 uplink on 437.075MHz. It uses
a Raised Cosine 1200bps BPSK (on SSB) AX.25 downlink on 437.102MHz. In other
words this is a PSK packet radio transponder. Very interesting...It also has
a ATV NTSC camera on board. We in ZS however uses PAL :-(

>1. Which filter shape I should use at the demodulator ?
>   I have read one G3RUH's article about it and it seems that almost
>   every satellite transmits with a different symbol shape ?
>   Is there a good comprimise or one should really match the shape
>   for best noise performance ?

So Pawel WO-18 uses Raised Cosine on downlink.

The 400bps beacon on AO-13 is however differentially encoded and then
Manchester encoded by exoring the data by the clock of 400Hz. A third order
Bessel at 560Hz LPF is then applied. This resulting signal is then fed
directly into a balanced modulator ie like a SSB transmitter. So please
correct me if I am wrong but this is different to normal 2m FM packet radio.
They use NRZ-S encoding on 2m packet so to speak.

Can a 400bps BPSK AO-13 beacon decoded datastream be fed into a 2m packet
HDLC decoder ?

>
>2. Doppler drift: from what I see I should expect up to 80-100 Hz/second
>   of carrier drift on 70 cm (and 5 times more on 2400 MHz) ?
>   If the tranceiver tunes in 10 Hz steps the UP/DOWN "botton pushing rate"
>   gets to some 10 per second which sounds quite many ?
>   Is that OK for most tranceivers ?
>   What is the typical time needed to hold the button so it reacts

Yes I am using an IC-275. It has a datamode so its synthesizer can switch very rapidly between tx and rx and rx and rx. And think it is done in about 5ms. So ten times a second is 100ms which is 10x slower.

?
>
>3. Transmitting to the satellite: The signal should be 1200 bps
>   Manchester encoded which is "almost" the same as 1200 bps BPSK
>   on a 1200 Hz carrier. My modem generates BPSK by it's nature
>   and there is no problem to tell it to make carrier at 1200 Hz
>   but there is no guarantie that the carrier stays synchronous
>   with the data stream. Is this the strict requirement for satellite's
>   uplink ?

Yes here again I need some confirmation. As I understand it they use NRZ-S line coding on AX.25 but this is done in the HDLC part of the software ?

I am also wondering about the 'carrier stays synchronous with the datastream'. Is this really necessary and why ? I see that the literature for some 1200bps PSK modems say that there is a jumper where you can apply your own clock if you want to create a Manchester stream at a different frequency. I was also wondering if this clock must have a certain phase relationship with the datastream. This I can say: on the JAS-1/FO-12 PSK modem there is TP4 where one can apply your own 1200Hz clock. I don't know whether this satellite is still active but that is what its docs say. May be other 1200bps PSK sats are simular.

Hope there is some expert out there who can confirm/deny/explain all this.

73 Danie ZS6AWK